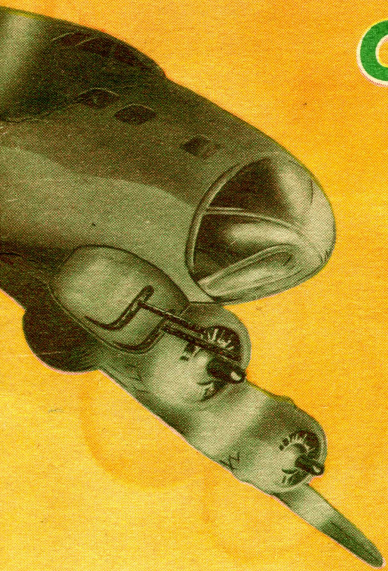


LT. R. H. STRONG
Crew 3262



OPERATION OF THE BENDIX CHIN TURRET

GENERAL SPECIFICATIONS

Armament

Two Caliber .50 M-2 machine guns.
Ammunition Capacity 365 rounds per gun.

Speed of Turret

Slow speed (tracking) $1/4^\circ$ per second to 12° per second.
High speed (slewing, with high speed button depressed) $1/4^\circ$ per second
 33° per second.

Weights

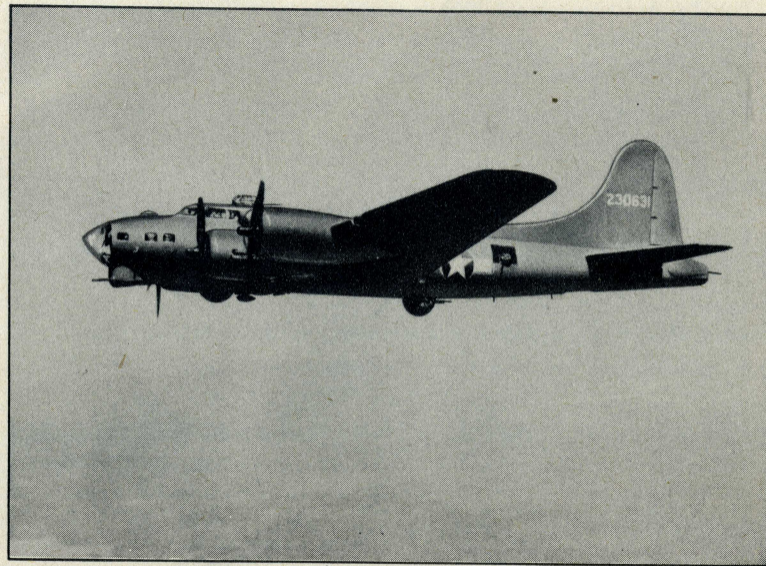
Turret Complete (no guns or ammunition) 438 lbs.
Ammunition 33 lbs. per 100 rounds.
Guns 65 lbs. each.

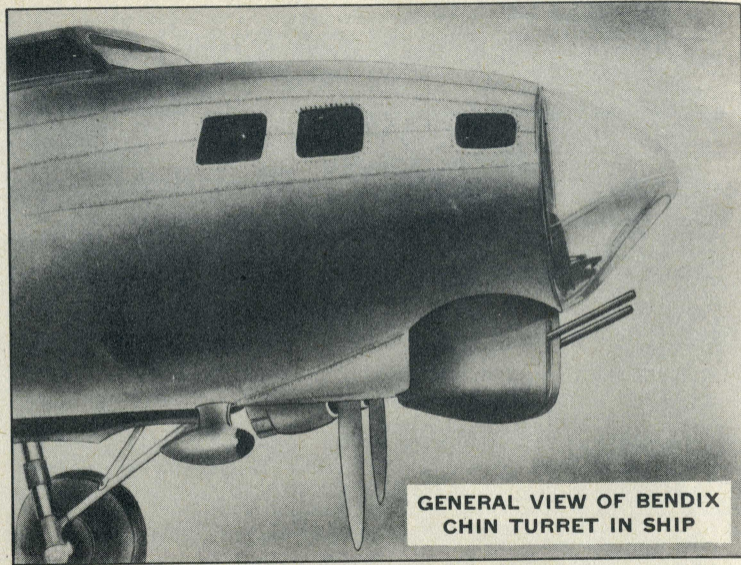
Gear Drive

Speed Reducer ratio 25-1.
Azimuth gear ratio 50-1.
Elevation gear ratio 42-1.
Azimuth gear train reduction 1250-1.
Elevation gear train reduction 1050-1.

Electrical Requirements

24 Volt D. C.
Peak starting current motor amplidynes 1280 amps.
Maximum current draw running full load 92 amps.
Maximum current draw running no load 40 amps.

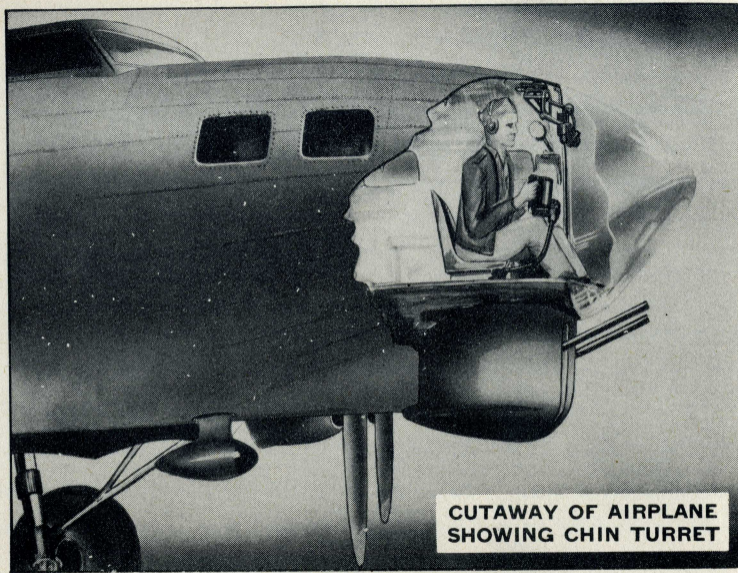




GENERAL DESCRIPTION BENDIX CHIN TURRET

The Bendix Chin Turret Model "D" is an electrically driven power turret, mounting two caliber, .50 M-2 Machine Guns, equipped with recoil absorbing mechanism, firing solenoids, and hydraulic gun chargers.

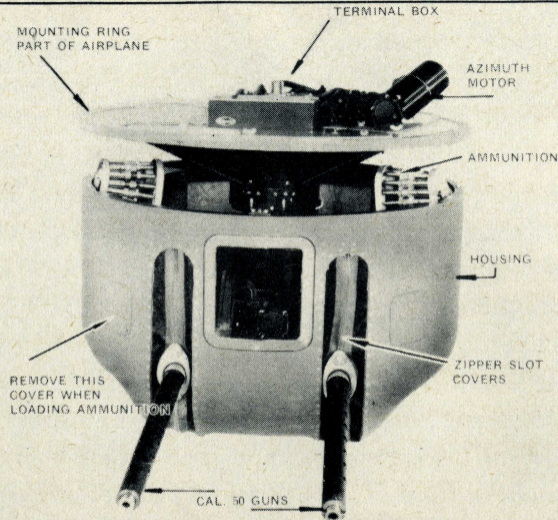
The turret is designed to be mounted in the Bombardier's Compartment and to be operated by the Bombardier to protect the forward approaches to the ship. The guns rotate 172° in azimuth (86° to the left and to the right of forward,) and swing from 26° above horizontal to 46° below horizontal. Switch limits are adjustable. The turret is mounted at floor level in the front of the Bombardier's Compartment. The guns extend below the fuselage at the nose of the ship. The lower assembly, with the exception of the gun barrels



which protrude through zippered covered slots, is enclosed in an aluminum, movable housing to minimize wind resistance. Plexiglass windshields seal the space at the floor of the ship around the turret.

Ammunition containers are fixed to the movable housing and are equipped with guide chutes and rollers which permit ammunition to flow to the guns while they are rotating in elevation and in azimuth. The empty case and belt links are ejected by chutes through the bottom of the housing and fall clear of the ship.

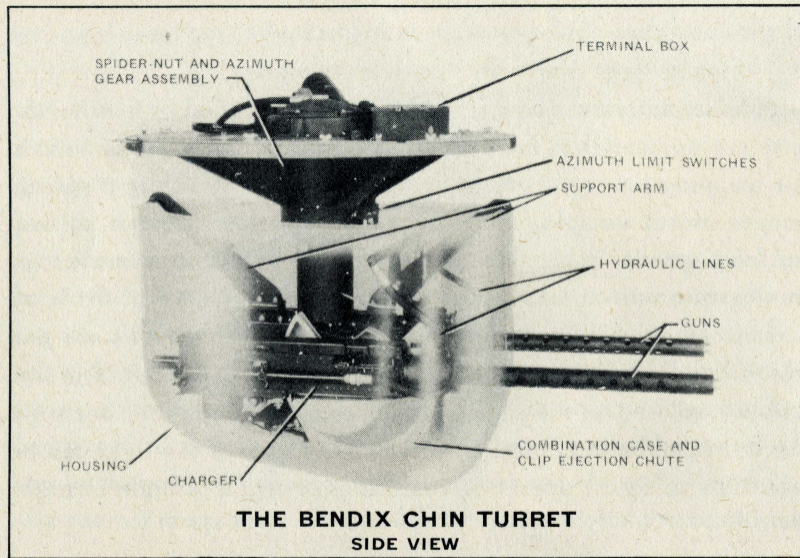
The Bombardier is the Chin Turret Gunner, and operates the Chin turret from the Bombardier's position by lifting a latch and swinging the turret controller from its stowed position against the right side of the fuselage to the combat position which is at a convenient height in front of the gunner. A main power switch and a charging button are located on the controller column at the front



**THE BENDIX CHIN TURRET
FRONT VIEW**

of the controller. An open sight is suspended at eye level from the top of the fuselage above the operators position.

The direction and speed of the guns are controlled by handle bar type control handles. Each handle contains a safety brake switch for stopping the turret should the gunner relax his grip; a spring trigger switch for firing the guns, and a high speed switch for fast tracking speeds. Movements of the control handle in azimuth and in elevation move potentiometers which vary the control fields of azimuth and elevation Amplidyne generators. The variable out put of the Amplidyne generators control the direction and speed of the azimuth and elevation turret driving motors. The speed of the turret can be varied from $1/4^\circ$ per second to 12° per second in low speed and from $1/4^\circ$ to 33° per second in high speed. The Amplidyne system of control automatically furnishes a constant speed for any set-



ting of the control handles regardless of the change of torque.

The open sight is synchronized with the movements of the gun in azimuth and in elevation and is driven by tachometer shafts from the azimuth and elevation gear trains. The gunner's field of view thus always includes the direction in which the guns are pointing and moves with the guns. The sight is equipped with a rheostat to control the intensity of the light of the two concentric circles which are projected on the sight glass.

The center of the field of view is marked by the center of these two circles and is the point on which the guns are trained. The two circles are used in the same manner as a ring sight and dot on a flexible machine gun installation. The intensity of the light can be varied to satisfy the operating conditions of bright sunlight or night flying.

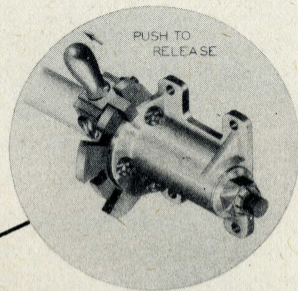
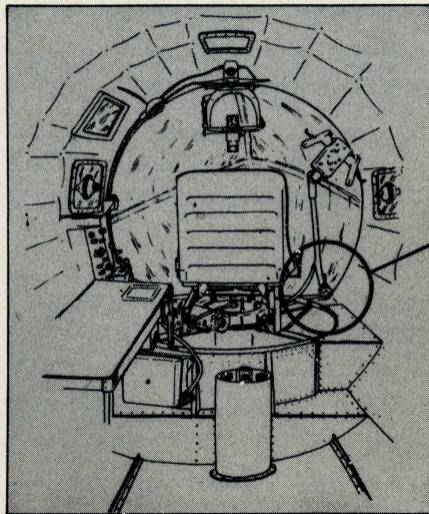
To operate the turret the Bombardier lifts the control column latch and swings the controller and column from the stowed position to the combat position; moves the power switch to the power position, charges the guns by depressing the charger switch, and adjusts the intensity of the sight reticle to the light conditions. The movements of the guns in azimuth and in elevation are controlled by the handle bar type control handles. The turret can be operated only when the safety switch on the outside of either control handle is depressed. Rotation of turret in azimuth follows rotation of the control handles clockwise or counter-clockwise about the vertical axis. The swing of the guns in elevation follows swing of the control handles up or down. The speed of the guns is proportional to the degree of movement of the control handles from the neutral position in low speed. The guns are moved in high speed by depressing the high speed button on the top of either control handle.

High speed of the guns is proportional to the degree of movement of the control handles from the neutral position. Looking through the sight, the gunner trains the guns on the target by moving the control handles. The guns are fired by pressing the trigger switch on the front of either control handle.

The gunner can follow a target freely, firing as required without the guns striking the fuselage or firing into any part of the ship. The limits of the gun movements in azimuth and elevation are automatically controlled by switches.

The turret can be stopped by releasing the control handle safety switches on the side of the control handles. The power supply to the turret is cut off by moving the main power switch to the "OFF" position. The turret can rotate in azimuth and the guns swung in elevation by use of a hand crank in the event of electric power failure.

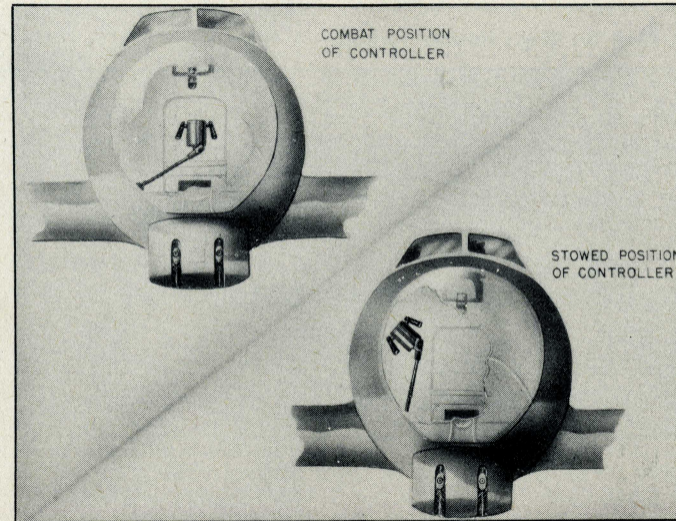
OPERATION



Step 1. Release Controller and Arm.

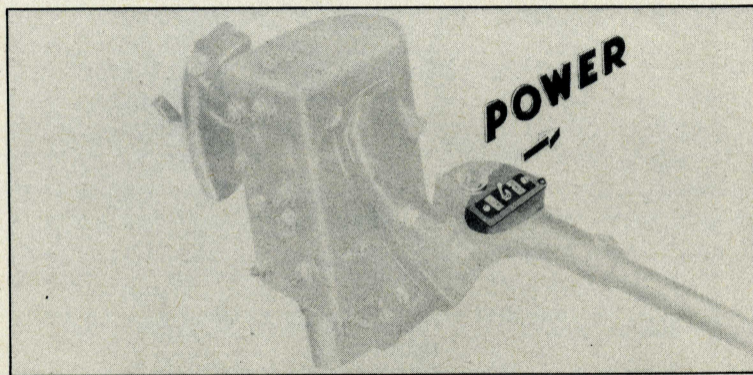
The controller and arm are held in a stowed position when not in use. Release knob at the lower right side of gunner.

OPERATION



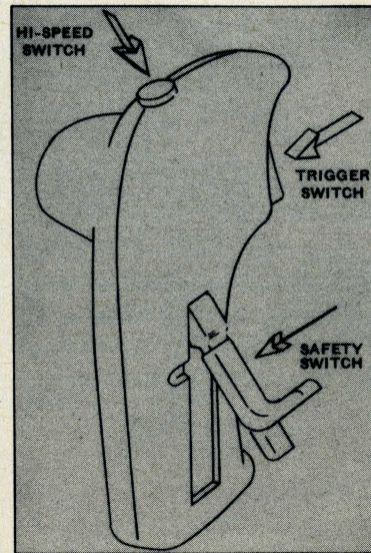
OPERATION

Step 2. Turn on Main Power Switch.



Located on controller arm in front of controller.

OPERATION



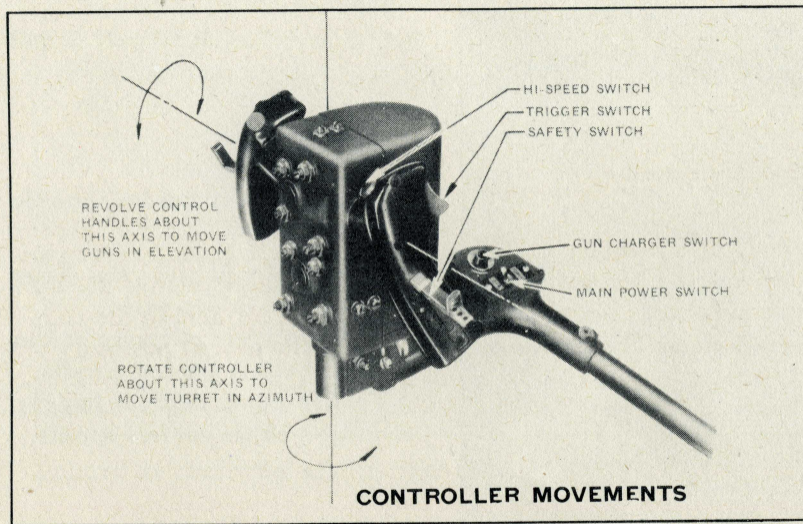
Step 3. Depress control handle safety switches.

The turret will run when either safety switch is depressed.

For high speed, depress button on top of either control handle.

To fire guns, depress trigger switch on either control handle.

OPERATION



OPERATION

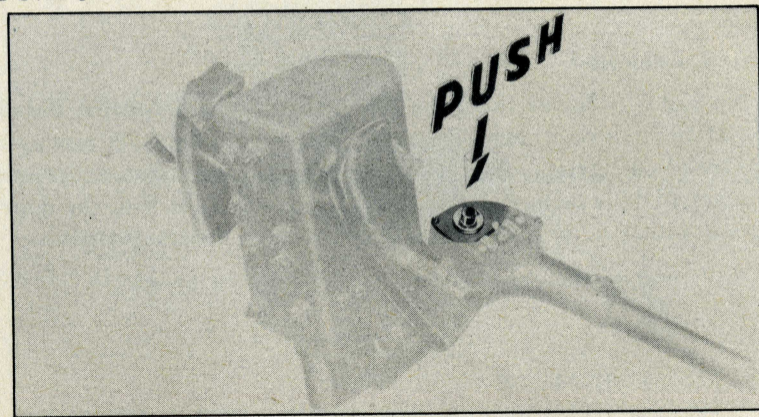
Step 4. Controller.

To raise or lower the guns in elevation rotate control handles about the horizontal axis. To rotate the turret in azimuth, move controller about vertical axis. Turret moves in same relative direction as controller is turned, the speed being proportional to the degree of movement of the control handles from the neutral position.

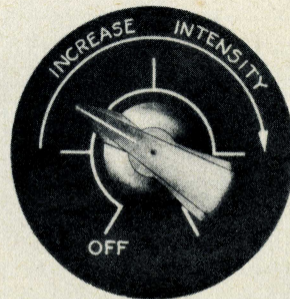
OPERATION

Step 5. Charge the guns with the Hydraulic Charger.

Depress the button in front of the controller. Do not hold down for over 30 seconds.

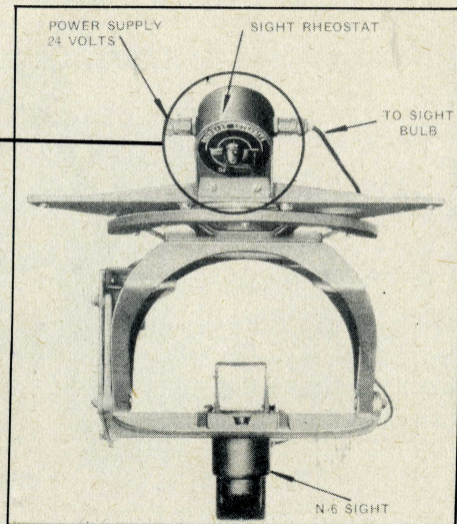


OPERATION

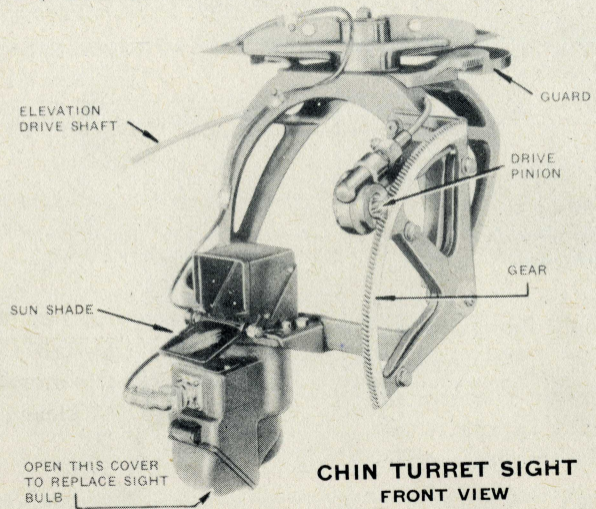


Step 6. Sight Reticle Intensity.

Rotate sight rheostat to control the intensity of light of the two concentric circles in the sight.

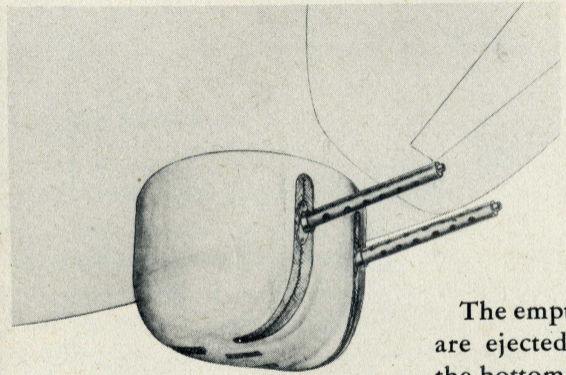


MAINTENANCE

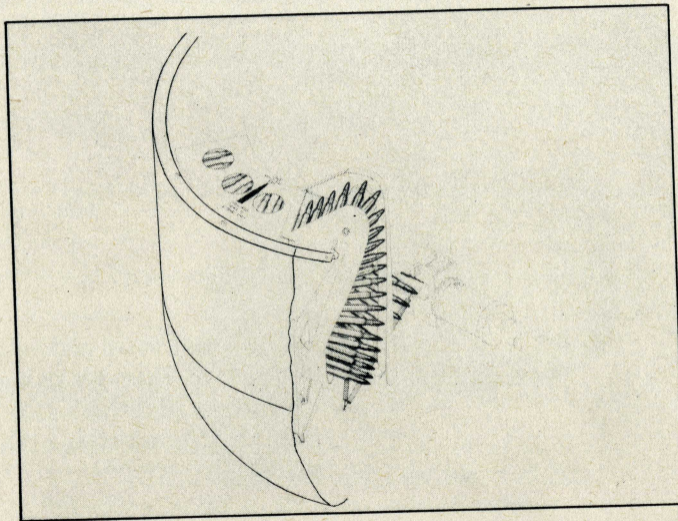


CHIN TURRET SIGHT
FRONT VIEW

MAINTENANCE

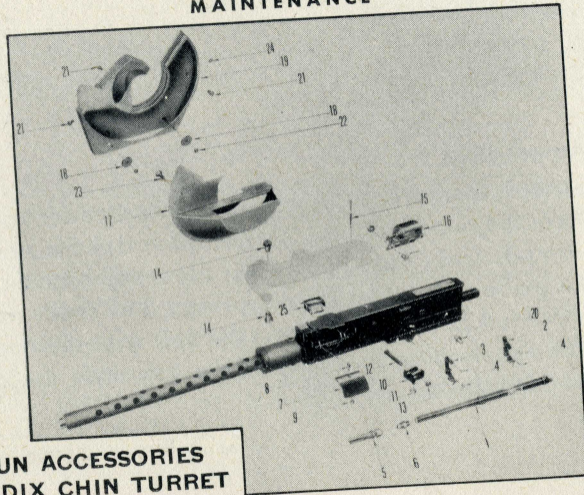


The empty cases and belt links are ejected through chutes out the bottom of the movable housing, and carried clear of the airplane.

**Loading Ammunition.**

The shells are loaded into the ammunition container so that they point towards the center column. Thread the end of the ammunition belt that extends from the top layer of the ammunition container through the guide rails and over the springs. The shells now point the same direction as the guns. Insert the belt with the double link first into the ammunition feed way of the gun until the cartridge holding pawl is actuated.

MAINTENANCE

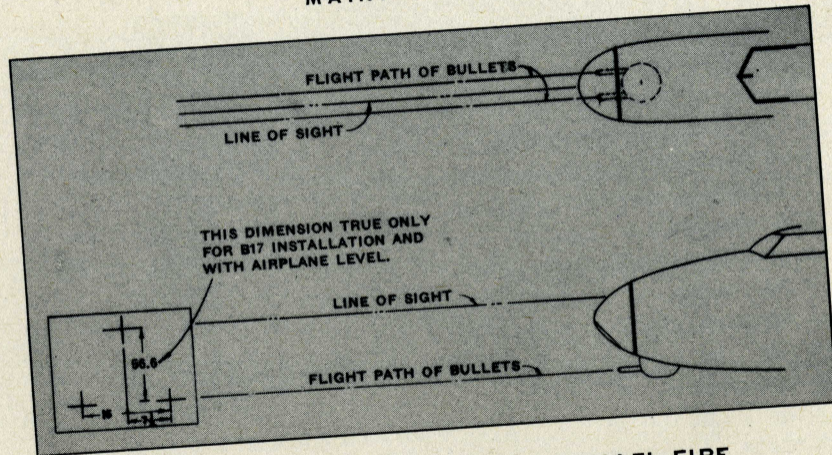


**GUN ACCESSORIES
BENDIX CHIN TURRET**

MAINTENANCE

The following accessories are added to the caliber .50 machine gun when used on the Bendix Chin Turret.

- | | |
|--------------------------------|--------------------------------|
| 1. HYDRAULIC CHARGER | 14. YOKE STUD |
| 2. REAR BRACKET FOR CHARGER | 15. EJECTION CHUTE ANCHOR BOLT |
| 3. FRONT BRACKET FOR CHARGER | 16. FIRING SOLENOID |
| 4. MOUNTING SCREWS FOR CHARGER | 17. CASE EJECTION CHUTE |
| 5. HYDRAULIC HOSE | 18. ROLLER |
| 6. HYDRAULIC COUPLING | 19. CLIP EJECTION CHUTE |
| 7. SHELL GUIDE | 20. CHARGING PIN |
| 8. MOUNTING CLEVIS | 21. CLIP CHUTE MOUNTING BOLT |
| 9. NUT | 22. NUT |
| 10. RECOIL GUIDE | 23. CASE CHUTE MOUNTING SCREW |
| 11. NUT | 24. WASHER |
| 12. RECOIL ADJUSTMENT STUD | 25. AUXILIARY CLIP CHUTE |
| 13. NUT | |

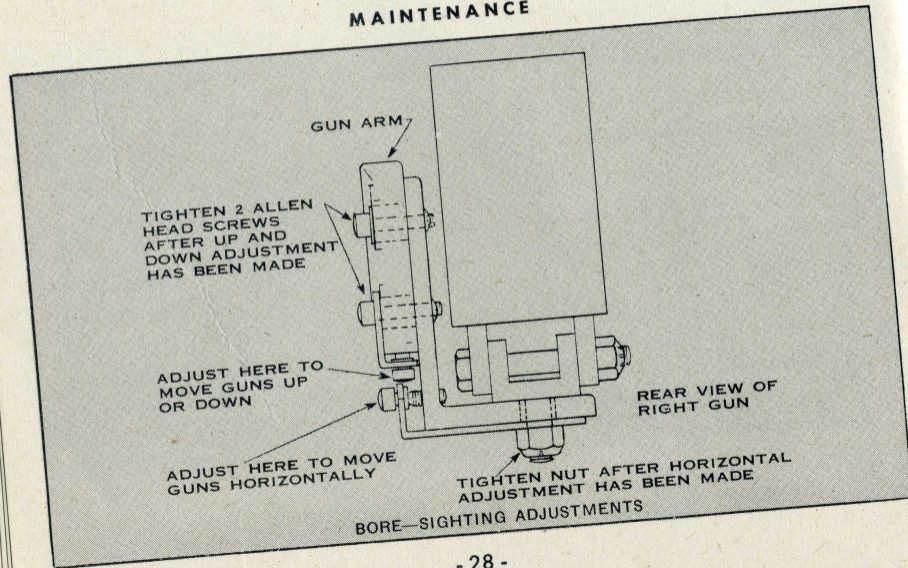


HARMONIZATION SET UP FOR PARALLEL FIRE

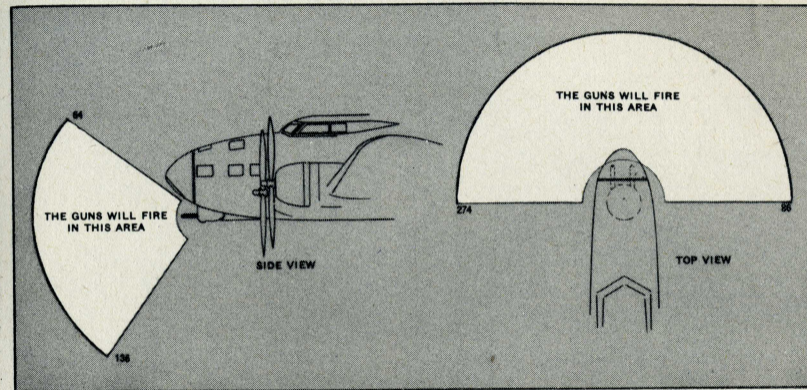
Harmonization of sight and guns.

The turret is provided with adjustments for the machine guns and sight which will permit the guns and sight to be set up for parallel or converging fire. For parallel fire the flight path of the bullets from the two guns and the sight line are all parallel. The guns are mounted so that the flight path of the bullets are in a horizontal plane 56.6" below the sight line. With the guns straight forward the flight path of the bullets are $7\frac{1}{2}$ " to either side of a vertical plane passed through the sight line.

MAINTENANCE

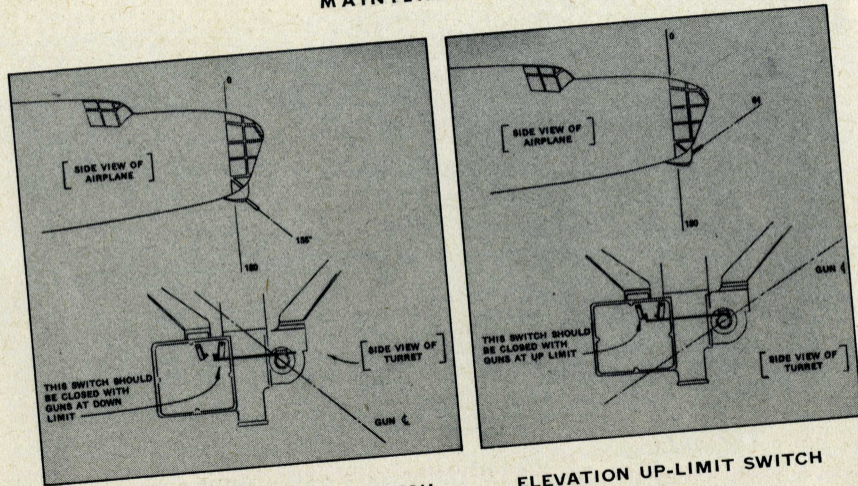


MAINTENANCE



FIELD OF FIRE

MAINTENANCE



ELEVATION DOWN LIMIT SWITCH

ELEVATION UP-LIMIT SWITCH

MAINTENANCE

Adjustment of elevation limit micro-switches.

PROCEDURE.

(1) Remove the entire movable housing by removing the bolts, that hold the housing to the arms, and four button head screws holding housing to foot casting.

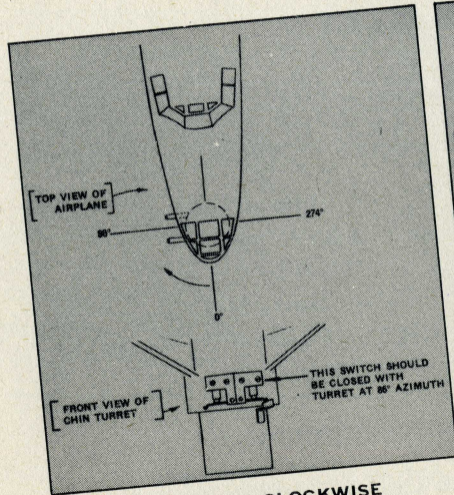
(2) Remove right hand side cover plate from relay box.

ADJUSTMENT.

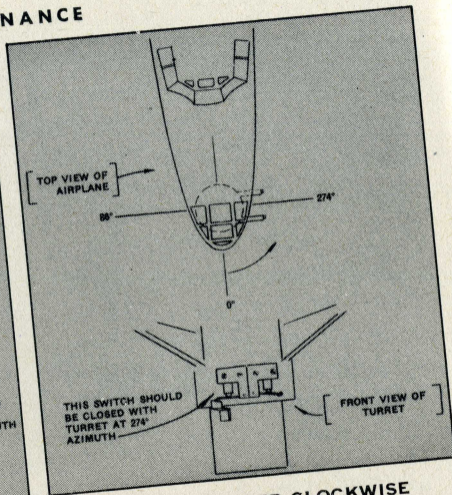
(3) Crank guns to down limit 136° zenith (check with protractor level). Foot of elevation limit rack should just actuate down limit switch at this point. Loosen adjusting screw and slide limit switch stop until micro switch just closes. (Check with ohmmeter.)

(4) Crank guns to up limit 64° zenith (check with protractor level) foot of elevation limit rack should just actuate up limit switch at this point. Loosen adjusting screw and slide limit switch stop until foot of elevation limit rack just actuates up limit micro switch.

MAINTENANCE



**AZIMUTH CLOCKWISE
DYNAMIC BRAKE SWITCH**



**AZIMUTH COUNTER-CLOCKWISE
DYNAMIC BRAKE SWITCH**

MAINTENANCE

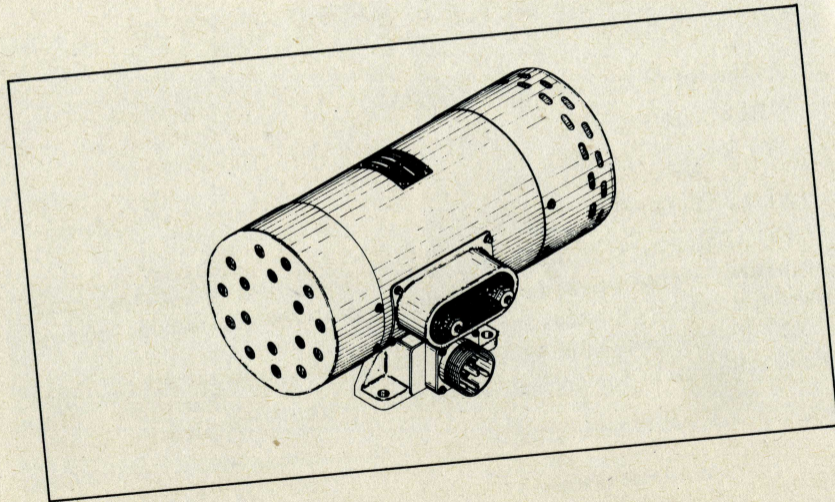
Adjustment of azimuth limit switches.

PROCEDURE.

- (1) Remove movable housing.

ADJUSTMENT.

- (1) Using hand crank rotate guns clockwise to 86° azimuth, turn adjusting screw on azimuth limit switch lever to actuate micro-switch as arm just raises lever.
- (2) Rotate guns counter-clockwise to 274° azimuth and perform same adjustment for counter-clockwise limit switch.



Compounding instructions Model "D"

PROCEDURE.

(1) Loosen locking nuts of the compounding rheostats located on the sides of the amplidyne. If the turret slows down under load turn the rheostat in the direction of the arrow, until it runs at a constant speed under load. If the turret speeds up under load turn the adjusting rheostat in the opposite direction from that of the arrow, until it will run at a constant speed under load.

(2) Depress high speed button and set high speed compounding adjustment at a low RPM (no load) so that no change in RPM occurs when the turret is loaded, that is applying a 40 lb. load to the front of the gun arm.

(3) Release high speed button and set the normal speed compounding adjustment at a low RPM (no load) so that there is no change in RPM when the turret is loaded, that is applying a 40 lb. load to the end of the gun arm.

(4) Tighten both locking nuts on the compounding adjustment.

(5) The above procedure must be followed for both azimuth and elevation.

MAINTENANCE

Greasing

To check the grease level of the azimuth gear assembly, unscrew the Allen head cap screw located in the center of the inspection panel on the side of the azimuth gear housing at the bottom of the center column. The grease must be at this level, if below it is necessary to add grease. The plug on the top of the azimuth gear housing is removed to fill with grease to proper level.

To check the grease in the speed reducer, back out the Allen head screw in the center of the side inspection plate. If the grease is not up to this height, remove top inspection plate and add grease.

The elevation gear housing grease level is checked by removing the plug on the side of the gear housing. Grease is added through the plug hole on top of the gear housing.

MAINTENANCE

Maintenance Checks

1. Be sure turret is supplied with 20 volts or more for proper operation.

2. Check all firing limits and dynamic brakes by swinging turret in azimuth and elevation against all stops and through all restricted firing zones.

Note the guns do not strike fuselage or fire into any part of the ship.

3. Inspect sight for illuminated reticle. If reticle fails to light, switch to other filament. Switch for this is located on side of sight.

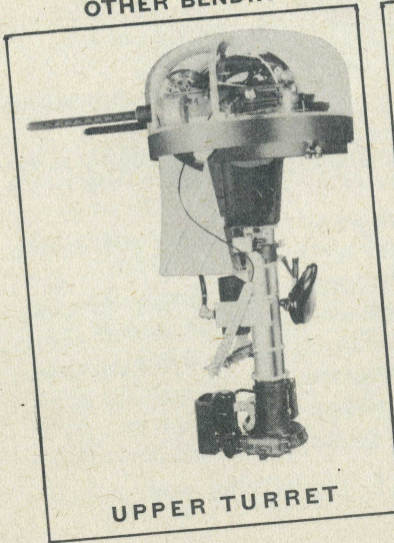
4. Ammunition containers should be filled and ammunition threaded over rollers and into gun properly.

5. Charge the guns to be sure that charger is functioning.

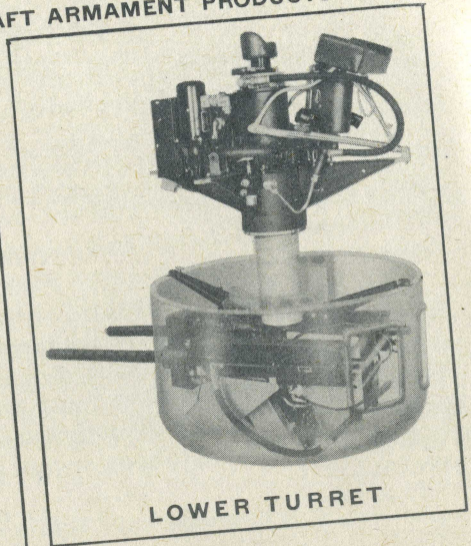
6. Depress the interphone switch to test the ship's interphone system.

7. Be sure that the guns and sight are harmonized correctly.

OTHER BENDIX AIRCRAFT ARMAMENT PRODUCTS

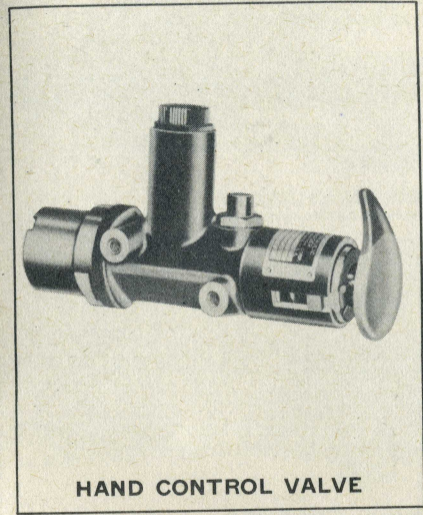


UPPER TURRET

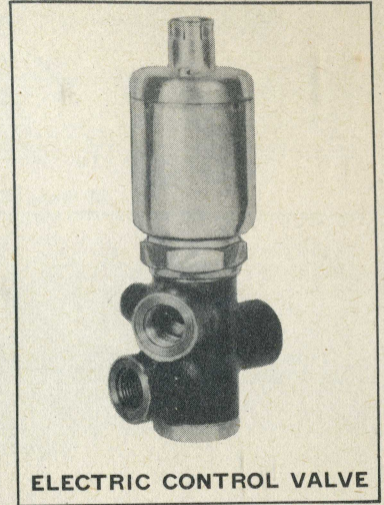


LOWER TURRET

OTHER BENDIX AIRCRAFT ARMAMENT PRODUCTS

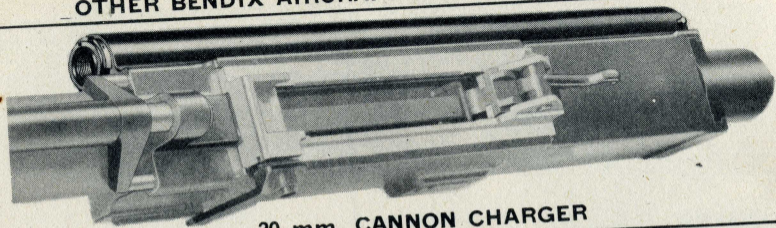


HAND CONTROL VALVE

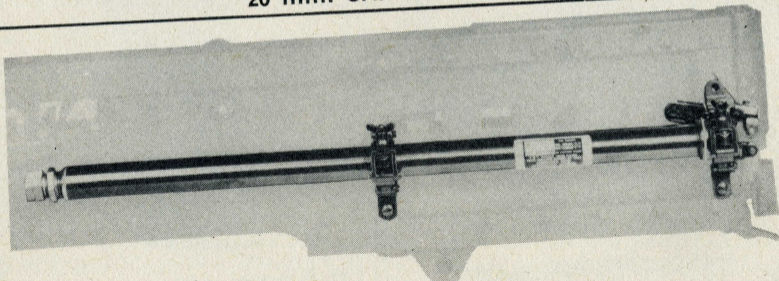


ELECTRIC CONTROL VALVE

OTHER BENDIX AIRCRAFT ARMAMENT PRODUCTS



20 mm. CANNON CHARGER



50 cal. HYDRAULIC CHARGER

Main Wiring Diagram

POLARITY AND VOLTAGE DETERMINED BY POSITION OF CONTROL HANDLES.

ANTI-SHUNT FIELD STABILIZES CONTROL FIELD AND REDUCES AMPLIFYING OUTPUT TO ZERO WHEN BRAKE IS ON.

AMPLIFYING DRIVING MOTOR. CONSTANT SPEED IN VOLTS

WITH PRONG "H" ON CONTROLLER PLUS POSITIVE WITH RESPECT TO PRONG "M" ON CONTROLLER OUT. PUT TO ZERO WHEN BRAKE IS ON.

SHUNT FIELD DIV. SERIES FIELD

ANTI-SHUNT MOTOR AMPLIFYING ASSET RATE

COMPENSATING FIELD INCREASES AMPLIFYING OUTPUT IN PROPORTION TO ARMATURE CURRENT DRAWN BY AZIMUTH MOTOR.

POLARITY AND VOLTAGE DETER. MINED BY POSITION OF CONTROL HANDLES.

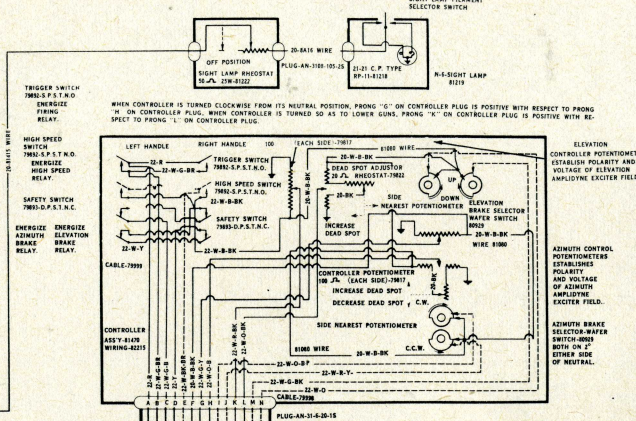
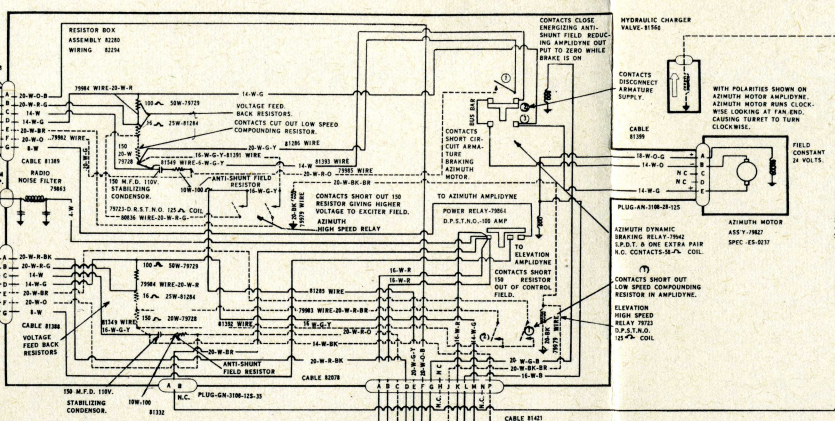
ANTI-SHUNT FIELD STABILIZES CONTROL FIELD AND REDUCES AMPLIFYING OUTPUT TO ZERO WHEN BRAKE IS ON.

WITH PRONG "H" ON CONTROLLER PLUS POSITIVE WITH RESPECT TO PRONG "L" ON CONTROLLER PLUS OUTPUT POLARITY OF ELEVATION MOTOR AMP. IS AS SHOWN.

AMPLIFYING DRIVING MOTOR. CONSTANT SPEED IN VOLTS.

ELEVATION MOTOR AMPLIFYING ASSET RATE

COMPENSATING FIELD INCREASES AMPLIFYING OUTPUT IN PROPORTION TO ARMATURE CURRENT DRAWN BY ELEVATION MOTOR.



AMPLIFYING DRIVING MOTOR. CONSTANT SPEED IN VOLTS.

ELEVATION MOTOR AMPLIFYING ASSET RATE

COMPENSATING FIELD INCREASES AMPLIFYING OUTPUT IN PROPORTION TO ARMATURE CURRENT DRAWN BY ELEVATION MOTOR.



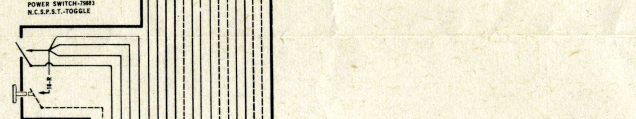
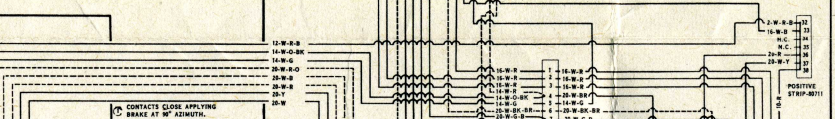
CONTACTS SUPPLY CURRENT TO FIRING SOLENOIDS.

CONTACTS CLOSE APPLYING ELEVATION BRAKE AT 180° ZENITH.

FIRING RELAY 7887-D.V.S.T. N.C. 10-1 COIL ENERGIZED BY CLOSING TRIGGER SWITCH

ELEVATION LIMIT SWITCHES 7849 MICROCONTACTS TYPE BR-1, N.O.B.P.D.T. WIRE RUN PLUG-AN-3106-10-25

FIRING SOLENOID-7853



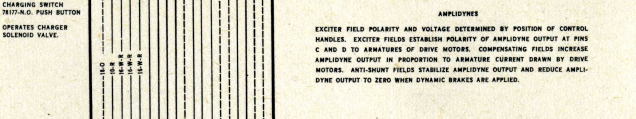
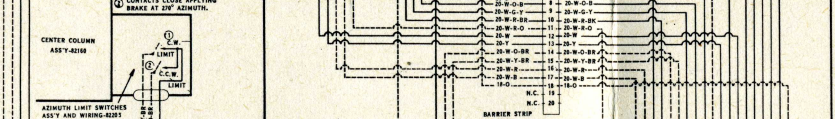
CONTACTS SUPPLY CURRENT TO FIRING SOLENOIDS.

CONTACTS CLOSE APPLYING ELEVATION BRAKE AT 180° ZENITH.

FIRING RELAY 7887-D.V.S.T. N.C. 10-1 COIL ENERGIZED BY CLOSING TRIGGER SWITCH

ELEVATION LIMIT SWITCHES 7849 MICROCONTACTS TYPE BR-1, N.O.B.P.D.T. WIRE RUN PLUG-AN-3106-10-25

FIRING SOLENOID-7853



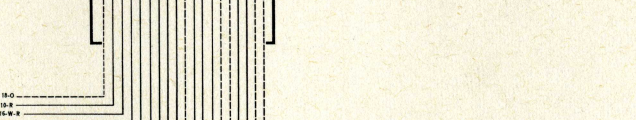
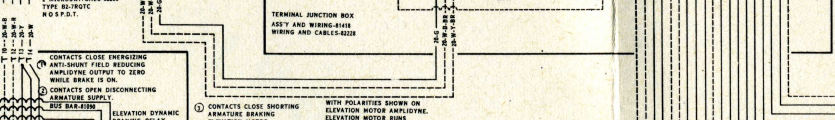
CONTACTS SUPPLY CURRENT TO FIRING SOLENOIDS.

CONTACTS CLOSE APPLYING ELEVATION BRAKE AT 180° ZENITH.

FIRING RELAY 7887-D.V.S.T. N.C. 10-1 COIL ENERGIZED BY CLOSING TRIGGER SWITCH

ELEVATION LIMIT SWITCHES 7849 MICROCONTACTS TYPE BR-1, N.O.B.P.D.T. WIRE RUN PLUG-AN-3106-10-25

FIRING SOLENOID-7853



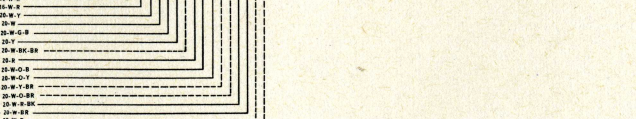
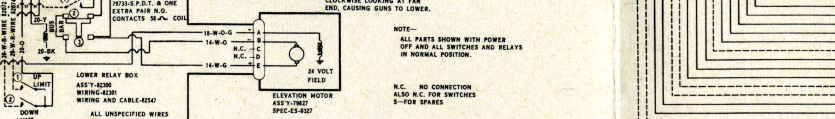
CONTACTS SUPPLY CURRENT TO FIRING SOLENOIDS.

CONTACTS CLOSE APPLYING ELEVATION BRAKE AT 180° ZENITH.

FIRING RELAY 7887-D.V.S.T. N.C. 10-1 COIL ENERGIZED BY CLOSING TRIGGER SWITCH

ELEVATION LIMIT SWITCHES 7849 MICROCONTACTS TYPE BR-1, N.O.B.P.D.T. WIRE RUN PLUG-AN-3106-10-25

FIRING SOLENOID-7853



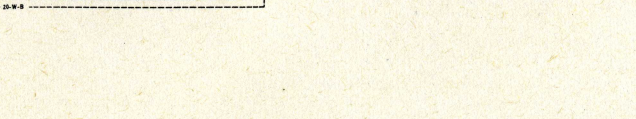
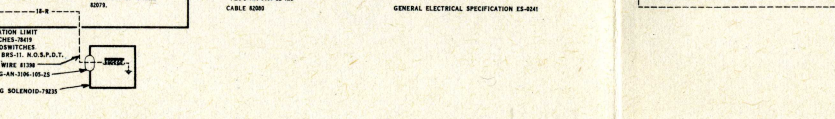
CONTACTS SUPPLY CURRENT TO FIRING SOLENOIDS.

CONTACTS CLOSE APPLYING ELEVATION BRAKE AT 180° ZENITH.

FIRING RELAY 7887-D.V.S.T. N.C. 10-1 COIL ENERGIZED BY CLOSING TRIGGER SWITCH

ELEVATION LIMIT SWITCHES 7849 MICROCONTACTS TYPE BR-1, N.O.B.P.D.T. WIRE RUN PLUG-AN-3106-10-25

FIRING SOLENOID-7853



GENERAL ELECTRICAL SPECIFICATION IS-841